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Report on the individual review of the annual submission of Italy submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Italy, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 15 to 20 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland), Mr. Michael Gytarsky (Russian Federation) and Ms. Jolanta Merkeliene (Lithuania); energy – Mr. Ralph Harthan (Germany), Ms. Tahira Munir (Pakistan) and Mr. Jongikhaya Witi (South Africa); industrial processes and solvent and other product use – Ms. Nouf Aburas (Saudi Arabia) and Mr. Ole-Kenneth Nielsen (Denmark); agriculture – Ms. Hongmin Dong (China) and Mr. Kazumasa Kawashima (Japan); land use, land-use change and forestry (LULUCF) – Mr. Kevin Black (Ireland), Mr. Raehyun Kim (Republic of Korea) and Mr. Vladimir Korotkov (Russian Federation); and waste – Mr. Seungdo Kim (Republic of Korea) and Mr. Gabor Kis-Kovacs (Hungary). Mr Goodwin and Mr. Witi were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Italy, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team's (ERT's) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised guidelines, namely the "Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines), adopted through decision 24/CP.19. Therefore, when preparing the 2015 annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Italy was carbon dioxide (CO_2), accounting for 83.8 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (7.8 per cent) and nitrous oxide (N_2O) (6.0 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.4 per cent of the overall GHG emissions in the country. The energy sector accounted for 82.4 per cent of total GHG emissions, followed by the agriculture sector (7.7 per cent), the industrial processes sector (6.1 per cent), the waste sector (3.5 per cent) and the solvent and other product use sector (0.3 per cent). Total GHG emissions amounted to 461,191.24 Gg CO_2 eq and decreased by 11.1 per cent between the

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*	
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*	
Annex A sources		CO_2	434 656.30	434 656.30	444 943.68	463 695.60	414 809.77	424 993.19	413 379.40	386 666.73	−11.0	
		CH_4	43 766.38	43 766.38	44 363.74	38 377.55	38 310.82	37 823.76	36 741.72	36 081.97	−17.6	
		N_2O	37 461.55	37 461.55	38 476.96	29 567.30	28 041.26	27 020.36	26 746.65	27 526.54	−26.5	
		HFCs	351.00	351.00	679.81	7 161.58	7 768.67	8 298.75	8 804.23	9 246.26	2 534.3	
		PFCs	2 486.74	2 486.74	1 266.38	1 500.59	1 062.81	1 330.83	1 454.54	1 314.04	−47.2	
		SF_6	332.92	332.92	601.45	435.53	398.02	373.27	351.38	355.72	6.8	
KP-LULUCF	Article 3.3[b]	CO_2				−4 461.57	−5 197.01	−5 783.32	−4 400.77	−4 772.68		
		CH_4				27.42	33.20	17.70	32.68	97.63		
		N_2O				12.72	15.40	8.21	15.16	45.30		
	Article 3.4[c]	CO_2	NA			−27 400.33	−30 022.62	−30 994.08	−23 786.02	−25 374.17	NA	
		CH_4	NA			142.85	166.13	85.21	151.57	436.78	NA	
		N_2O	NA			66.27	77.08	39.53	70.32	202.64	NA	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2

Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year 2012*
Annex A sources		Energy	417 715.70	417 715.70	431 113.11	448 933.42	404 866.49	414 913.91	403 641.41	379 862.79	–9.1
		Industrial processes	38 389.92	38 389.92	35 937.40	35 316.97	30 347.86	31 264.53	31 048.99	28 201.34	–26.5
		Solvent and other product use	2 454.62	2 454.62	2 234.87	1 947.38	1 817.82	1 669.45	1 647.93	1 515.72	–38.3
		Agriculture	40 829.71	40 829.71	40 601.26	36 209.01	35 130.24	34 264.54	34 448.78	35 397.23	–13.3
		Waste	19 664.96	19 664.96	20 445.39	18 331.38	18 228.94	17 727.73	16 690.81	16 214.17	–17.5
		LULUCF	NA	–3 608.58	–23 700.21	–25 817.48	–27 683.08	–31 119.38	–19 138.63	–18 556.30	NA
		Total (with LULUCF)	**NA**	**515 446.32**	**506 631.82**	**514 920.68**	**462 708.27**	**468 720.79**	**468 339.29**	**442 634.95**	**NA**
		Total (without LULUCF)	**519 054.90**	**519 054.90**	**530 332.02**	**540 738.16**	**490 391.34**	**499 840.17**	**487 477.92**	**461 191.24**	**–11.1**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				–6 351.72	–7 088.50	–7 708.11	–6 310.26	–6 594.25	
		Deforestation				1 930.28	1 940.08	1 950.70	1 957.33	1 964.50	
		Total (3.3)				**–4 421.43**	**–5 148.41**	**–5 757.41**	**–4 352.93**	**–4 629.75**	
	Article 3.4[d]	Forest management				–27 191.21	–29 779.41	–30 869.33	–23 564.13	–24 734.75	
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	NA			NA	NA	NA	NA	NA	NA
		Total (3.4)				**–27 191.21**	**–29 779.41**	**–30 869.33**	**–23 564.13**	**–24 734.75**	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for all gases. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 4 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR (submitted on 15 April 2014). Italy also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 4 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Italy submitted revised emission estimates on 3 November 2014 in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Italy on 3 November 2014 (see paras. 46–49 below).

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Italy. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete for the years 1990–1992 and 2010–2012, not complete for the years 1993–2009	Mandatory: CO_2 emissions from mineral wool production (operations ceased in 2009) (see para. 42 below)
		Non-mandatory: CO_2, CH_4 and N_2O emissions from multilateral operations
		The ERT encourages the Party to estimate and report emissions from all non-mandatory categories

Issue	*Expert review team assessment*	*General findings and recommendations*
Land use, land-use change and forestry[a]	Not complete	Mandatory: carbon stock change (CSC) from mineral soils on grassland remaining grassland in "other wooded lands"; CSC living biomass and soils due to conversion of grassland to flooded land (see para. 55 below) The ERT recommends that the Party estimate and report emissions from all mandatory categories
		Non-mandatory: CSC from dead organic matter in cropland and grassland converted to wetlands; CSC from all pools in wetlands remaining wetlands and settlements remaining settlements; and CSC in dead organic matter pool from grassland converted to settlements The ERT encourages the Party to estimate and report emissions from all non-mandatory categories for which methods are provided in the IPCC good practice guidance for LULUCF
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	
Time-series consistency	Sufficiently consistent	Please see paragraphs 61 and 65 below for category-specific recommendations. Italy is recommended to report emissions from lime application consistently over the time series (see para. 61 below)
The ERT's findings on QA/QC procedures	Sufficient	Italy has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan Please see paragraphs 32 and 56 below for category-specific recommendations
The ERT's findings on transparency	Sufficiently transparent	Please see paragraphs 28, 31, 32, 33, 34, 35, 39, 41, 42, 50, 51, 54, 55, 56, 57 and 58 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, IPCC good practice guidance for LULUCF = the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

12. The NIR described the national system for the preparation of the inventory. As indicated by the Party in its NIR, there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Italy submitted in 2013,[3] remains relevant.

Inventory preparation

13. Table 4 contains the ERT's assessment of Italy's inventory preparation process.

Table 4
Assessment of inventory preparation by Italy

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Both tier 1 and tier 2	The ERT welcomes Italy's plans to update the tier 2 uncertainty analysis for the LULUCF sector and to expand it to other categories in the next annual submission

[3] FCCC/ARR/2013/ITA, paragraphs 9 and 10.

Issue	*Expert review team assessment*	*ERT findings and recommendations*
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	To improve the transparency of the NIR, the ERT recommends that Italy include more information on the assumptions and references used to estimate uncertainties in the category-specific chapters or in an annex to the NIR
Quantitative uncertainty (including LULUCF)	Level = 4.9% Trend = 3.8%	
Quantitative uncertainty (excluding LULUCF)	Level = 3.6% Trend = 2.5%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

Inventory management

14. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by the Party in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Italy submitted in 2013,[4] remains relevant.

5. Follow-up to previous reviews

15. Italy has addressed all of the recommendations made for the energy sector (see para. 19 below), the industrial processes and solvent and other product use sectors (see para. 30 below), the agriculture sector (see para. 44 below) and the LULUCF sector (see para. 53 below).

16. Recommendations from previous reviews that have not yet been implemented (see para. 55 below), as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

17. The energy sector is the main sector in the GHG inventory of Italy. In 2012, emissions from the energy sector amounted to 379,862.79 Gg CO_2 eq, or 82.4 per cent of total GHG emissions. Since 1990, emissions have decreased by 9.1 per cent. The key driver for the fall in emissions is an increasing share of renewable energy as a result of the policies adopted at the European and the national level starting from 2004. Also, as a consequence of the introduction of the European Union Emissions Trading System (EU ETS) in 2005, a shift from petrol products to natural gas in energy production has been observed. Owing to the financial crisis and the economic recession, sectoral emissions have further decreased since 2009. Within the sector, 33.2 per cent of the emissions were from energy industries,

[4] FCCC/ARR/2013/ITA, *paragraph 12*.

followed by 27.9 per cent from transport, 22.4 per cent from other sectors and 14.5 per cent from manufacturing industries and construction. Fugitive emissions from oil and gas accounted for 1.9 per cent and other (fuel combustion) accounted for 0.1 per cent. The remaining 0.02 per cent were fugitive emissions from solid fuels.

18. Italy has made recalculations between the 2013 and 2014 annual submissions for this sector. Compared with those in the 2013 annual submission, the recalculations decreased the estimated emissions in the energy sector by 802.12 Gg CO_2 eq (0.2 per cent) for 2011 and decreased the estimated total national emissions by 0.2 per cent for 2011. The overall changes due to recalculations are smaller for the other years of the time series. For 2011, the two most significant recalculations were in the categories transport and other sectors. The recalculations were made following changes, inter alia, to the CO_2 emission factor (EF) for natural gas for the whole energy sector for 2011 and an update of the activity data (AD) and parameters used for the estimation of emissions from transport for the whole time series. The recalculations were adequately explained.

19. The ERT commends Italy for addressing all the recommendations made in the last two annual review reports. Follow-up questions on the implementation of recommendations raised by the ERT were also adequately addressed by Italy during the review. Improvements since the last annual submission include: more detailed information in the NIR on how emissions from iron and steel are allocated between and within the energy and industrial processes sectors; and the incorporation of EFs for all subcategories in the NIR. In response to further questions raised by the ERT during the review, the Party provided additional information on trends in emissions and implied emission factors (IEFs). The ERT commends Italy for this increase in transparency and encourages the Party to continue to include further information on trends in emissions and IEFs in the NIR.

2. Reference and sectoral approaches

20. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross-references*
Difference between the reference approach and the sectoral approach	Energy consumption: 89.12 PJ, 1.66% CO_2 emissions: 3 198.05 Gg CO_2, 0.87%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

21. No problems were identified.

International bunker fuels

22. No problems were identified.

Feedstocks and non-energy use of fuels

23. No problems were identified.

3. Key categories

Stationary combustion: all fuels – CO_2

24. Italy has included in its NIR information on electricity generation by source. A significant drop of electricity generation from natural gas and a sharp increase of electricity generation from solid fuels was reported between 2010 and 2012. In response to a question raised by the ERT during the review, the Party explained that this drop was driven by the economic recession and the increase of renewable sources in the energy mix. Also, in 2011 'spring revolutions' led to a decrease in availability and higher prices of natural gas imported by pipelines from Algeria and Libya. At the same time, a large new coal-fired power plant became fully operational. The Party informed the ERT in response to a question raised during the review that further information on electricity generation by fuel type and corresponding CO_2 EFs can be found on the Internet.[5] The ERT encourages Italy to include further information on the trend in electricity generation by fuel type and corresponding emissions in its annual submission.

25. The ERT noted that the IEF for CH_4 emissions from liquid fuels in public electricity and heat production shows a slightly decreasing trend since 2006, with the exception of 2011, where a sudden drop can be observed. In response to a question raised by the ERT during the review, the Party explained that the IEF is the weighted average of the EFs for gasoil and residual oil, which equal 1.5 g/GJ and 3 g/GJ, respectively. The decreasing trend in the IEF therefore was due to the minor use of fuel oil (residual oil) for energy production, with a minimum in 2011, while the amount of gasoil has a more stable trend owing to its use in the start-up of power plants. The ERT encourages the Party to include further information on the IEF trends in its annual submission.

26. In the 2014 NIR, the trend in GHG emissions in other sectors is explained. CO_2 emissions from agriculture/forestry/fisheries decreased by only a small amount between 2011 and 2012, whereas corresponding CH_4 emissions decreased by more than half in the same period. In response to a question raised by the ERT during the review, the Party explained that CH_4 emissions in this category are driven by the use of biomass (especially wood) in the agriculture sector for the heating of greenhouses and aquaculture plants. According to the national energy balance, between 2011 and 2012, the fuel consumption in this sector was reduced by more than half, with the most noticeable decrease being of fuel wood consumption. The ERT encourages the Party to include further information on the trend in GHG emissions from agriculture/forestry/fisheries in its annual submission.

[5] <http://www.sinanet.isprambiente.it/it/sia-ispra/serie-storiche-emissioni/fattori-di-emissione-per-la-produzione-ed-il-consumo-di-energia-elettrica-in-italia/view>.

Road transportation: all fuels – CO_2

27. GHG emissions from transport have been rather constant between 2009 and 2011, whereas there is a sharp decrease in 2012, which almost corresponds to the level in 1990. In response to a question raised by ERT during the review, Italy explained that the trend in the transport sector is driven by road transport. Further, the Party explained that, according to the national energy balance, a reduction of gasoline fuel consumption (about 12 per cent) and diesel (10 per cent) for road transport has been observed between 2011 and 2012, and a slight increase of liquefied petroleum gas (LPG) (7 per cent) and compressed natural gas (4 per cent). The overall drop in consumption and the corresponding decrease in GHG emissions can be explained by the economic crisis and, to a minor extent, by the increasing share of low-consumption vehicles. The ERT encourages the Party to include further information on the trend in GHG emissions in the transport sector in its annual submission.

4. Non-key categories

Solid fuel transformation – CH_4

28. In its 2014 NIR, Italy explains that CH_4 emissions from solid fuel transformation relate to the production of coke in the iron and steel industry. In reviewing the Italian energy balance, the ERT noted that, in the years 2008–2012, charcoal production is occurring in Italy, for which fugitive emissions may occur. In response to a question raised by the ERT during the review, Italy explained that charcoal production was carried out in traditional systems until the 1960s, but more recently charcoal is mainly produced in modern furnaces (e.g. using the Van Marion Retort system), where exhaust gases are recycled to produce the energy for the furnace itself. Therefore it is assumed that there are no CH_4 emissions from the production of charcoal. The ERT appreciates the explanation by the Party and recommends that Italy provide information in its NIR on the charcoal production process, including information on when in the time series the modern technology replaced conventional technology.

C. Industrial processes and solvent and other product use

1. Sector overview

29. In 2012, emissions from the industrial processes sector amounted to 28,201.34 Gg CO_2 eq, or 6.1 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 1,515.72 Gg CO_2 eq, or 0.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 26.5 per cent in the industrial processes sector, and decreased by 38.3 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are: decreasing production in the categories of mineral products, chemical industry and metal production; the implementation of abatement equipment in adipic acid and nitric acid production; and the change in process technology in aluminium production. Within the industrial processes sector, 49.5 per cent of the emissions were from mineral products, followed by 34.4 per cent from consumption of halocarbons and SF_6, 6.2 per cent from chemical industry and 5.7 per cent from metal production. The production of halocarbons and SF_6 accounted for 4.2 per cent. Emissions from other production were reported as "NA" (not applicable).

30. Italy has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant recalculation made by Italy between the 2013 and 2014 annual submissions was in consumption of halocarbons and SF_6: HFCs in refrigeration and air-conditioning equipment. The recalculation was made following changes in EFs. Other recalculations performed were a result of recommendations made in the previous expert review. Compared with those in the 2013 annual submission, the total

recalculations resulted in a decrease in the estimated emissions in the industrial processes sector by 591.93 Gg CO_2 eq (1.8 per cent) and a decrease in the estimated total national emissions by 0.1 per cent. The recalculations were adequately explained.

31. Significant parts of the emission inventory for the industrial processes sector are based on companies reporting under different reporting instruments. The NIR frequently refers to reporting under the EU ETS and the national European Pollutant Emission Register (EPER/PRTR). While the requirements for monitoring, reporting and verification are well established under the EU ETS and publically available, it is not clear what requirements are in place for reporting to EPER/PRTR, specifically for companies reporting under the EPER/PRTR, especially concerning reporting of AD, the methodologies used for estimating AD and emissions and associated uncertainties. In response to a question raised by the ERT during the review, Italy provided information on the legal framework and the data types and their availability to the inventory team. The ERT recommends that Italy includes this information in the NIR.

2. Key categories

Adipic acid production – N_2O

32. During the review the ERT noted that, according to the table on page 122 of the NIR, the abatement system was in operation in 2012 for a longer time than the actual production, resulting in a utilization factor of 1.002, as listed in the NIR. The ERT also noted that the abatement efficiency is high compared with the default value for catalytic destruction in the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC good practice guidance) as well as in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) and has been constant since 2008. In response to questions raised by the ERT during the review, Italy clarified that the utilization factor in the NIR for 2012 was a transcription error (the correct value being 1.000, meaning that the abatement system was in operation 100 per cent of the operating hours). Italy also informed the ERT that the catalytic destruction system in operation at the sole production facility in Italy is based on a technology patented by the operator, and within the framework of the EU ETS detailed data have been submitted by the plant for the years 2005–2009 so that the facility can be included in the EU ETS from 2012. Emissions, and consequently abatement efficiency, are calculated on the basis of measurements; a monitoring system was installed in 2011, whereas for the previous years sample measurements were used to monitor the abatement efficiency. The ERT recommends that Italy correct the error identified and include the additional justification for the abatement efficiency of the sole production facility in Italy in the NIR.

Consumption of halocarbons and SF_6 – HFCs

33. Based on the description in the NIR, it is not clear to the ERT whether emissions from imported products are considered and, if so, how. In response to a question raised by the ERT during the review, Italy indicated that the estimates are based on the consumption of fluorinated gases (F-gases) in the different categories and the data include the fluid contained in imported products. As an example, the details of information concerning air-conditioning devices mounted on vehicles and metered dose inhalers were provided to the ERT, clarifying that the estimation of emissions takes into account not only the information related to national manufacturing but also to imported products. The ERT recommends that Italy include this information in the NIR.

34. The NIR states that emissions from disposal are included in the emissions from use, with the exception of SF_6 from electrical equipment, and the same is indicated in the CRF tables by using the notation key "IE" (included elsewhere). However, it is not clear how

this works in practice (i.e. how it is assured that F-gases remaining in the products at decommissioning are accounted for, as emissions or completely recovered). In response to a question raised by the ERT during the review, Italy informed the ERT that legislative decree no. 151/05 has implemented the European Union (EU) directive on waste from electric and electronic equipment in Italy. According to this decree, when equipment is disposed of, it is a legal requirement to recover the remaining F-gases and either reuse or destroy them. The ERT considers that the product life factors used by Italy are reasonable and, as such, the amount of fluid remaining can be calculated based on the emissions during the product's lifetime. Based on information provided by the Party to the ERT during the review, the ERT also considers that the use of the notation key "IE" is inappropriate as there are no emissions from disposal. The ERT recommends that Italy expand the description in the NIR regarding disposal and change the notation key used in the CRF tables to "NA". Furthermore, the ERT recommends that Italy make contact with the treatment centres to verify that the recovery rate can be assumed to be 100 per cent (i.e. that no fugitive losses occur).

35. The NIR presents two distinct time series for leakage rates. There is a very steep decrease in some of the leakage rates from 1999 to 2000 (e.g. manufacturing leakage rates decrease from 3 per cent to 0.5 per cent for chillers, large commercial refrigeration and domestic refrigeration, as well as there being lower use leakage rates for chillers and large commercial refrigeration). Based on the information in the NIR, it is not clear what developments prompted this big decrease between the two years. In response to a question raised by the ERT during the review, Italy explained that for the years 1990–1999 leakage rates were supplied by industrial associations of manufacturers as the best available country-specific information for the years concerned and that the industrial associations have revised the leakage rates for the years 2000–2012 to take into consideration the changes in technology that have occurred in the manufacturing of the equipment concerned. The ERT considers it reasonable that there has been a decrease in emissions from manufacturing, but finds it unlikely that the change occurred in a specific year and finds that the time series could be inconsistent. In response to the draft review report, Italy stated that the year 2000 is considered to be a turning point for the industry. However, no supporting information, for example on regulations implemented, changes in prices of F-gases or technological improvements, was provided either in the NIR or in the response to the draft review report on what technical improvements or other incentives occurred precisely in the year 2000 that resulted in a decrease in the leakage rate of more than 80 per cent. The ERT recommends that Italy provide information in the NIR to prove that this significant reduction occurred between 1999 and 2000.

36. During the review, the ERT noted that there was no information in the NIR on the source of AD for fire extinguishers and that the AD for new charges have been constant since 2005 (150 t). In response to a question raised by the ERT during the review, Italy provided information on the current data sources and indicated plans for collecting and updating AD for this category. The ERT welcomes the plans and recommends that Italy report on their implementation.

37. Based on the description in the NIR, the emission estimation for metered dose inhalers does not follow the IPCC good practice guidance. The IPCC emission estimation methodology is to calculate emissions as half of the charge in year t plus half of the charge in t–1, while Italy calculates emissions equal to the charge in any given year. In response to a question raised by the ERT during the review, Italy explained that the trend is stable and that implementing the IPCC good practice guidance would mean slightly lower emissions for the period 2008–2012. The ERT agrees that emissions are not underestimated but recommends that Italy follow good practice methods to estimate emissions.

38. The previous review recommended that Italy report AD and emissions separately for domestic and commercial refrigeration. Italy has implemented this recommendation in the 2014 annual submission and the ERT commends Italy for this improvement.

3. Non-key categories

Lime production – CO_2

39. The previous review report contained recommendations for Italy to improve the description of lime production. Italy has to a large extent implemented the recommendations and the ERT commends Italy for the improvements made. However, the ERT noted that the NIR states that an EF derived as the average for 2000–2003 has been applied for the years 1990–1999, while the IEF reported in the CRF tables fluctuates through the years (1990–1999). In response to a question raised by the ERT during the review, Italy explained that lime production includes both production of lime at lime facilities and production of lime in other non-lime facilities (e.g. iron and steel plants and sugar mills). Concerning lime facilities, the information included in the NIR about the methodology to derive the EF for the years 1990–1999 is confirmed; however, the EF related to non-lime facilities fluctuates over the years, so the resulting IEF for CO_2 from lime production shows minor fluctuations. The ERT recommends that Italy include this explanation in the NIR.

40. The ERT considered that the drop in the IEF from 2004 to 2005 for lime production was not explained in full. For 1990–2004 the IEF is approximately 0.80 t/t, while the IEF for 2005–2012 is approximately 0.70 t/t. In response to a question raised by the ERT during the review, Italy explained that for the years 2000–2004 the CO_2 EF is based on the lime facility data supplied for the overview of the lime sector for the implementation of the EU ETS. The information collected regarding the EU ETS covers the years 2000–2003 and the EF for 2004 was set equal to the EF for 2003. For the years 2000–2003 all the lime facilities assumed the same values of EF for calcium carbonate (0.785) and magnesium carbonate (1.092) in the calculation of CO_2 emissions, regardless of the specific raw materials in use at the single facility. Considering that the data for 2000–2003 do not take into account the specific raw materials used at individual facilities, the ERT considers that the estimates for 2005 onwards are more accurate. Furthermore, since the IEF drops significantly from 2004 to 2005, it is probable that the lack of other information and not taking into account the specific raw materials used from 2000 to 2003 have led to an overestimation of emissions for these years. The ERT recommends that Italy further investigate the impact of the assumptions made in relation to the data collected for 2000–2003 and provide information in the NIR showing that those assumptions have not led to an overestimation of emissions for 2000–2003 and hence also for 1990–1999.

Limestone and dolomite use – CO_2

41. The ERT noted during the review that the IEF for limestone and dolomite use is constant through the whole time series and that it matches the stoichiometric EF based on limestone (0.44 t/t). The ERT enquired during the review whether there was use of dolomite in Italy and whether attempts had been made to verify the bottom-up data by use of a top-down approach. In response to the question raised by the ERT during the review, Italy confirmed that dolomite is used in cement and lime production and accordingly emissions have been allocated to these categories. Italy also clarified that it would not be possible to construct a top-down approach since import/export data are not available in sufficient detail. The ERT recommends that Italy clarify the text in the NIR regarding the use of dolomite.

42. Since Italy is using a bottom-up approach to estimate emissions relating to limestone and dolomite use, there is a risk that possible emission sources are not included. According

to the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, all other uses of limestone and dolomite that produce CO_2 emissions are to be reported. The ERT therefore enquired during the review whether mineral wool production occurs in Italy and whether these emissions are included in the total for this category. In response to a question raised by the ERT, Italy acknowledged that one mineral wool production facility had been operating from 1993 to 2009 and was not included in the inventory. Further, Italy provided preliminary data showing that the CO_2 emissions were in the range of 1–4 Gg. The ERT strongly recommends that Italy include this category in the emission inventory. Furthermore, the ERT recommends that Italy investigate other potential emissive uses of carbonates and provide information on the steps taken to ensure completeness in the NIR.

D. Agriculture

1. Sector overview

43. In 2012, emissions from the agriculture sector amounted to 35,397.23 Gg CO_2 eq, or 7.7 per cent of total GHG emissions. Since 1990, emissions have decreased by 13.3 per cent. The key driver for the fall in emissions is the reduction in the number of animals, cultivated area/crop production and recovery of biogas. Within the sector, 47.0 per cent of the emissions were from agricultural soils, followed by 30.1 per cent from enteric fermentation, 18.5 per cent from manure management and 4.3 per cent from rice cultivation. The remaining 0.1 per cent was from field burning of agricultural residues. Emissions from prescribed burning of savannahs have been reported as "NO" (not occurring).

44. Italy has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Italy between the 2013 and 2014 annual submissions were in the following categories: CH_4 emissions from enteric fermentation of dairy cattle and N_2O emissions from agricultural soils. The recalculations were made following: updates in the AD on organic soils and sewage sludge applied to soils; changes in the EFs owing to the update of data on milk production and fat content of milk for cattle; and in response to recommendations made in the previous review report. Compared with those in the 2013 annual submission, the recalculations decreased the estimated emissions in the agriculture sector by 41.57 Gg CO_2 eq (0.1 per cent) for 2011 and decreased the estimated total national emissions by 0.01 per cent. The recalculations were adequately explained.

45. The ERT commends Italy for addressing recommendations made in the previous review report by including information about each crop production and related parameters to improve the transparency of the agriculture inventory. However, the ERT identified that the transparency of the agriculture inventory could be improved, and encourages Italy to enhance the transparency of the inventory by including in its annual submission information relating to the selection and use of country-specific data and methods, particularly with regard to manure treated in digesters and lagoons, as well as agricultural soils.

2. Key categories

Manure management – CH_4 and N_2O

46. The ERT considered the approach used by Italy to estimate emissions from digesters to be inconsistent with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Italy calculated CH_4 emissions from manure management (digesters) for cattle and swine using a two-step approach. First, Italy estimated the CH_4 emissions from manure using a tier 2 method with country-specific CH_4 EFs according to the different manure management practices (i.e. liquid, solid, pasture, range and paddock for cattle). Second,

Italy subtracted from the CH_4 emissions from manure the amount of biogas produced in the digesters that is utilized for producing electricity/heat. However, estimates of the amount of biogas utilized come from a different source (TERNA), and the ERT considered these estimated quantities to be high compared with CH_4 levels in other animal waste management systems (AWMS), because biogas digesters optimize biogas generation whereas other AWMS do not. Further, the ERT also considered that Italy was excluding CH_4 emissions associated with leakage from the biogas plant. Hence the ERT concluded that the emissions were likely to have been underestimated.

47. In response to a question raised by the ERT during the review, Italy clarified that the actual quantity of manure treated in biogas digesters is unknown, along with the number of animals whose manure is managed by this AWMS. Further, Italy explained that it uses a country-specific methodology and EFs to estimate emissions and adopts an assumption of common manure management conditions, because biogas digesters are not so diffuse in Italy. Hence Italy subtracts the amount of biogas utilized (as supplied by TERNA) from the estimate of CH_4 emissions from manure.

48. In response to further questions raised by the ERT during the review regarding this potential underestimation, Italy explained that it agrees in principle with the concerns of the ERT and therefore intended to investigate this matter with the Research Centre on Animal Production. This matter was raised by the ERT as a potential problem, whereby the ERT recommended that Italy provide transparent justification that the current emission estimates as reported are not underestimated, and, if this cannot be done, the ERT recommended that Italy provide revised CH_4 estimates that separate the manure used in anaerobic digesters from the manure treated as slurry/solid in accordance with the IPCC good practice guidance, and develop its own country-specific methane conversion factor (MCF) for anaerobic digestion based on data from the anaerobic digestion/farming industry (and/or, where appropriate, on data from other Parties that have anaerobic digestion manure management estimates).

49. In response to the list of potential problems and further questions raised by the ERT, Italy submitted revised emission estimates for the years 1991–2012 (activity did not occur in 1990). Revised estimates were provided by Italy for CH_4 and N_2O, as changes in the CH_4 EF also affected the N_2O EF. This information was reviewed by the ERT. Italy calculated revised CH_4 and N_2O emission estimates using a country-specific methodology and MCF that separate the manure used in anaerobic digesters from the manure treated as slurry/solid. The recalculation increased the estimated GHG emissions from digesters by 20.3 per cent for 2012 (1,107.79 Gg CO_2 eq) and the estimated total GHG emissions by 0.2 per cent. The ERT concluded that Italy's estimate of GHG emissions from digesters has been prepared in line with the IPCC good practice guidance. The ERT considered the potential problem to have been resolved.

50. Italy has estimated CH_4 emissions from manure management for cattle and buffalo using a tier 2 method and country-specific values of 15.32 g CH_4/kg volatile solids (VS) for slurry and 4.80 g CH_4/kg VS for solid manure. However, Italy has not provided in its NIR a detailed description of the methodology. In response to a question raised by the ERT during the review, Italy provided such a description and a reference to the method used and explained how the country-specific parameters were derived. The ERT recommends that Italy include this information in its annual submission.

51. Italy has estimated CH_4 emissions from swine using 11 different country-specific emission rates (which vary according to weight) and also applied an 8 per cent reduction that takes into account the proportion of animal waste allocated to uncovered storage systems, which emit less CH_4 than covered systems. However, the basis of the 8 per cent emission reduction is not provided in the NIR. In response to a question raised by the ERT during the review, Italy explained that the shares of covered/uncovered storage systems are equal to 4 per cent and 96 per cent, respectively, and that the CH_4 emission rates used were:

41 normal litre CH_4/100 kg live weight/day for fattening swine and 47 normal litre CH_4/100 kg live weight/day for sows, including piglets, for covered storage systems; and 37.6 normal litre CH_4/100 kg live weight/day for fattening swine and 43.1 normal litre CH_4/100 kg live weight/day for sows, including piglets, for uncovered storage systems. The ERT recommends that Italy include this information in its annual submission.

E. Land use, land-use change and forestry

1. Sector overview

52. In 2012, net removals from the LULUCF sector amounted to 18,556.30 Gg CO_2 eq. Since 1990, net removals have increased by 414.2 per cent. The key driver for the rise in removals is the increase in the area of forest land from 7,589.80 kha in 1990 to 9,141.54 kha in 2012. Sporadic occurrence of wildfires on forest land and grassland had a large influence on annual emissions from forests and grassland, particularly in 1993 and 2007. Within the sector, 29,525.51 Gg CO_2 eq of net removals were from forest land, followed by 1,060.31 Gg CO_2 eq from grassland. Net emissions were reported from settlements (7,773.87 Gg CO_2 eq) and 4,255.65 Gg CO_2 eq from croplands. Emissions from wetlands were reported as "NE" (not estimated) and "NO", emissions from other land were reported as "NO" and emissions from other (LULUCF) were reported as "NA".

53. Italy has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Italy between the 2013 and 2014 annual submissions were in the following categories: grassland and settlements. Some of the recalculations were made in response to the 2013 annual review report in order to refine the land-use change matrices on the basis of the updated national land-use inventory (IUTI) framework and a reallocation of short rotation forest land from the cropland to the forest land category. New litter coefficients, methodologies for reporting wildfires and estimation of carbon stock changes in soil organic carbon (SOC) were developed and implemented. Compared with those in the 2013 annual submission, the recalculations decreased the estimated net removals in the LULUCF sector in the range of 6,016.87 Gg CO_2 eq to 12,236.97 Gg CO_2 eq for over the period 1990–2011 (19.5–79.1 per cent). The recalculations were adequately explained in the NIR.

54. The ERT considers that some of the documentation describing the derivation of AD, methodologies and models used to estimate emissions and removals from LULUCF lacks clarity and transparency. In particular, methods and data sources used to update the IUTI are not transparently communicated in the NIR. During the review, the ERT raised a question regarding how data from phase one of the national forest inventory (NFI) were used to construct the land-use matrices. For example, there is no documentation in the NIR regarding the use of historical ratios of forest and other wooded land (reported under grassland) to distinguish between forest land and shrubland, reported under grassland. Moreover, the methods that the FOR-EST model used to estimate biomass losses are not transparently described in the NIR. During the review, Italy provided additional information and referred to text in the NIR that outlined the nature of the AD and methods used. However, the ERT recommends that Italy include this additional information in its next submission.

55. As indicated in table 3, the LULUCF inventory is not complete and there are some emissions that have not been estimated. Emissions from dead organic matter (DOM), soils and biomass due to conversion of grassland to wetlands and settlements are reported as "NE" owing to a lack of data (see paras. 59 and 60 below). Similarly, emissions or removals from SOC pools in forest land remaining forest land are reported as "NE" because the Party has used the tier 1 method of a zero stock change. The ERT recommends that the Party use the notation key "NA" when a tier 1 zero stock change method is used. The ERT

recommends that Italy review the use of notation keys so that it is clearer what methods are used and whether some pools are not estimated.

2. Key categories

Forest land – CO_2

56. The FOR-EST model uses input data, such as forest mensuration variables, from the 1985 NFI to estimate biomass and DOM stock changes, which may now be outdated because a subsequent inventory was completed in 2005. During the review, in response to a question raised by the ERT, the Party explained that there is good agreement between the 2005 NFI data and the FOR-EST model estimated biomass variables for 2005, based on a validation exercise. The Party also indicated that the quality assurance/quality control (QA/QC) plan has made provisions to update modelled estimates of biomass stock changes when phases two and three of the 2015 NFI have been completed. The ERT welcomes these planned improvements, but recommends that the Party document model validations in the NIR and that the Party use NFI 2005 data to initiate model estimates until the new inventory data become available.

57. Short rotation forest crop areas have been included under the forest land category following recommendations made in the 2013 review report. The ERT welcomes this improvement by Italy. However, in order to improve transparency, the ERT recommends that the Party provide in the NIR documentation, as submitted during the review, summarizing harvest removals from short rotation crops, coppices and high forest categories so that the drivers influencing trends in biomass stock changes can be made more evident.

58. Italy transparently describes the allocation of carbon between the above-ground and below-ground biomass, litter and deadwood pools. However, during the review, the ERT raised a question regarding the definition of the pools and thresholds applied to different pools. For example, the ERT noted that no information is provided on the diameter threshold for deadwood and how this pool is differentiated from litter. Similarly, it is not clear which soil horizons are included in the soil pool or which pool contains the humus layer. Consequently it was difficult for the ERT to determine whether double counting of emissions by sources or removals by sinks for different carbon pools had occurred because there is a lack of clear information that defines each carbon pool. Italy provided additional information (definitions and thresholds) to the ERT that resolved the concerns of the ERT. The ERT recommends that Italy provide these definitions and thresholds in a new table in the NIR in the annual submission.

Land converted to settlements – CO_2

59. Italy reports an increase in the area of grassland converted to settlements of 26.7 kha per year from 1991 to 1995, but reports "NO" for biomass carbon stock changes and "NE" for DOM stock changes. In the NIR, it is reported that emissions from DOM pools are not estimated as there is insufficient information to enable this. However, the Party documents detailed methods to estimate biomass and DOM stocks and carbon stock changes in shrubland areas under the grassland category. The methods used to report emissions and removals from shrublands are similar to those applied to forest land. Moreover, Italy does report emissions from biomass and DOM due to forest land converted to settlements using a conservative approach. In order to apply a complete and balanced reporting approach across all land-use categories, the ERT recommends that Italy develop methods to distinguish between shrubland and other grassland conversions to settlements and report the associated emissions from biomass. If country-specific biomass carbon stocks for grassland (i.e. referred to as grazing land in the NIR) immediately before conversion to settlements are not available, the IPCC default value should be used. In addition, the ERT recommends

that the Party report biomass and DOM stock changes for the conversion of shrublands to settlements, if these do occur, using the same approaches as those used for forest land converted to settlements.

3. Non-key categories

Land converted to wetlands – CO_2

60. Italy describes land-use transitions from grassland and cropland to wetlands in the NIR but does not report the associated biomass stock changes. In response to a question raised by the ERT during the review, the Party confirmed that these are land conversions to flooded land. The ERT recommends that Italy estimate biomass stock changes associated with the flooding of grassland and cropland.

CO_2 emissions from agricultural lime application

61. The ERT noted that CO_2 emissions from agricultural lime application were only provided for 1998–2012. In response to a question raised by the ERT requesting clarification, the Party indicated that the QA/QC plan has made provisions to acquire the relevant data for the lime applied over the period 1990–1997 and to explore the possibility of disaggregating data from statistics on limestone and dolomite used for agricultural applications. The ERT welcomes this planned improvement and recommends that the Party report emissions from lime application consistently over the complete time series.

Direct N_2O emissions from nitrogen fertilization of forest land

62. Italy reports in the CRF tables that fertilization of forest land does not occur. In response to a question raised by the ERT during the review, the Party confirmed that nitrogen (N) fertilization of short rotation forest crops does occur, but direct emissions are reported under the agriculture sector. The ERT recommends that Italy report direct N_2O emissions from N fertilization as "IE" in CRF table 5(II) and transparently explain that these emissions are reported under the agriculture sector (with a cross reference to the relevant section of the NIR) in the annual submission.

F. Waste

1. Sector overview

63. In 2012, emissions from the waste sector amounted to 16,214.17 Gg CO_2 eq, or 3.5 per cent of total GHG emissions. Since 1990, emissions have decreased by 17.5 per cent. The key drivers for the fall in emissions are the national policy diverting solid waste from landfill to waste incineration plants and waste diversion measures. Composting and mechanical and biological treatment have shown a remarkable rise due to the enforcement of legislation. Within the sector, 69.7 per cent of the emissions were from solid waste disposal on land, followed by 28.7 per cent from wastewater handling and 1.5 per cent from waste incineration. The remaining 0.04 per cent was from other (waste).

64. Italy has made recalculations between the 2013 and 2014 annual submissions following changes in the AD for this sector. The most significant recalculation made by Italy between the 2013 and 2014 annual submissions was for solid waste disposal on land. The recalculation was made because of updated AD being available. Compared with those in the 2013 annual submission, the recalculations decreased the estimated emissions in the waste sector by 830.05 Gg CO_2 eq (4.7 per cent) and decreased the estimated total national emissions by 0.12 per cent. The recalculations were adequately explained.

2. Key categories

Solid waste disposal on land – CH_4

65. Emissions from this category amounted to 11,302.89 Gg CO_2 eq in 2012 and were derived using the IPCC tier 2 methodology with a mixture of country-specific parameters and IPCC default values. Italy estimated three different average values of methane generation constant (k) over the three relevant periods (1971–1990, 1991–2005 and 2006–2012) on account of the change in waste composition. The average (k) value for the first period is 0.463/year, which is much higher than 0.362/year for the next period (1991–2005), possibly raising inconsistency issues. For the third period (2006–2012) the value is almost identical to that for the second period (0.363). The changes in (k) value reflect country-specific changes in waste composition derived from national analysis, as documented in the NIR. The ERT considers it unlikely that the changes have happened in distinct steps. Therefore, the ERT encourages Italy to explore how to develop a time-series variation of the (k) value to reflect a more realistic transition, instead of using the step function variation over the relevant periods.

Waste incineration – CO_2

66. Emissions from this category amounted to 244.72 Gg CO_2 eq in 2012 and were calculated by applying the IPCC methodology with country-specific AD and EFs. Italy assumed a carbon content of 23.0 per cent, with the fossil carbon fraction of 35.0 per cent over the entire period. The waste compositions vary with time, allowing the variation of the carbon content as well as the fossil carbon fraction. The ERT recommends that Italy apply the time-series carbon content as well as fossil carbon fraction in line with the variation of the waste compositions, and report thereon in its next annual submission.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

67. Table 6 provides an overview of the information reported and parameters selected by Italy under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	Italy provided additional information during the week of the review to clarify forest conversions (see paras. 69 and 71 below)
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	Forest management Years reported: 2008, 2009, 2010, 2011 and 2012	

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	See paragraph 69 below

68. Chapter G.I includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin their reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities and the change from the first commitment period to the second commitment period, paragraphs 72–78 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

69. Italy updated the land-use classification methodology on the basis of new forest inventory information in response to a recommendation made in the previous review report. In response to questions raised by the ERT during the review, the Party detailed how the hierarchical classification system is used to identify areas subject to elected forestry activities and to distinguish between regenerating forest and regenerating scrubland (see para. 54 above). Italy also provided additional information showing how land with temporary forest cover loss is distinguished from deforestation. The ERT noted that QA/QC plans are in place to further refine these methods when phase two and three of the NFI become available. The ERT welcomes these improvements and considers that the definition, identification, tracking and reporting of removals and emissions associated with elected forest activities are in accordance with the IPCC good practice guidance for LULUCF and requirements set out in the annexes to decisions 15/CMP.1 and 16/CMP.1. The ERT would further encourage the Party to continually enhance the inventory as new information becomes available.

Deforestation – CO_2

70. Italy conservatively assumes that all deforested land is converted to settlements and all biomass, deadwood and litter are immediately oxidized following deforestation. In response to a question raised by the ERT during the review, the Party indicated that the ortho-photograph interpretation and classification methods used in phase one of the NFI 2015 could identify deforested areas, but it was not possible to identify what the forests were converted to. According to the Party, a precise determination of the land-use change will only be possible when ground-truthing plot surveys are carried out in the planned phase two of the NFI in 2015. Therefore, Italy assumes all of the identified deforested area is converted to settlements, which results in the highest emissions, when compared with other land-use conversions. The ERT agrees that emissions due to deforestation are not underestimated. The ERT envisages that the planned improvements following phase two

and three of the NFI would further enhance the inventory to ensure that emissions are neither over- nor underestimated.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO_2

71. Italy does not estimate emissions or removals from SOC pools and provides information to demonstrate that this pool is not a source. The ERT noted that it was not clear if the soil data used to perform the statistical regression analysis included carbon from litter pools or other non-soil horizons (see para. 58 above). In response to a question raised by the ERT, the Party confirmed that the analysis excluded the litter pool and that there was a text error in the heading to the table used to document validation of the model results. The ERT considers that Italy clearly demonstrated that SOC is not a source as specified under paragraph 6(c) of the annex to decision 15/CMP.1.

72. Direct N_2O emissions from N fertilization are reported not to occur for land subject to forest management activities. Although the ERT did determine that these emissions may occur in short rotation crops included under this elected activity (see para. 62 above), the Party indicated that these are reported under Annex A emissions from agriculture, since N fertilizer emissions are derived from total annual fertilizer use statistics. Based on the information provided during the review, the ERT is satisfied that estimates for Article 3, paragraph 4, of the Kyoto Protocol are clearly distinguished from anthropogenic emissions from sources listed in Annex A to the Kyoto Protocol (para. 5 of the annex to decision 15/CMP.1).

73. Italy does provide sufficient information that demonstrates that emissions or removals associated with Article 3, paragraph 4, activities are not accounted for under activities under Article 3, paragraph 3, of the Kyoto Protocol. However, the ERT encourages the Party to use the headings provided in the annotated NIR outline[6] to improve the transparency of its reporting of this information.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

74. Italy has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[7] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

75. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No

[6] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[7] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

76. Italy has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

77. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	−34 052 833		−34 052 833
Harvested land	NA		NA
Deforestation	9 742 901		9 742 901
Forest management	−50 966 667		−50 966 667
Article 3.3 offset[c]	NA		NA
Forest management cap[d]	−50 966 667		−50 966 667
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

[a] The values included under 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

78. Based on the information provided in table 7 for the activity afforestation and reforestation, Italy shall, for non-harvested land, issue 34,052,833 removal units (RMUs) in its national registry.

79. Based on the information provided in table 7 for the activity deforestation, Italy shall cancel 9,742,901 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

80. Based on the information provided in table 7 for the activity forest management, Italy shall issue 50,966,667 RMUs in its national registry.

Calculation of the commitment period reserve

81. Italy has reported its commitment period reserve in its 2014 annual submission. Italy reported that its commitment period reserve has not changed since the initial report review (2,174,650,108 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

82. Italy reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

83. Italy reported that there are changes in its national registry since the previous annual submission. The Party described the changes in its NIR. The changes include change in EU ETS functionality in release 5 and 6 of the national registry, regression and tests on the new functionality and the conduct of a site acceptance test. The ERT concluded that, taking into account the confirmed changes in the national registry, Italy's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

84. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Italy provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

85. In line with the EU commitment under Article 3, paragraph 4, of the Kyoto Protocol, Italy has developed a wide-ranging impact assessment system to accompany all new policy initiatives in the country. This approach ensures that potential adverse social, environmental and economic impacts on various stakeholders are identified and minimized within the legislative process. Italy also complied with the EU directive on the promotion of the use of renewable energy, the inclusion of aviation in the EU ETS and the development of a common EU agricultural policy. Italy is also involved in clean development mechanism projects in countries such as China, India, Nepal, Uganda, Argentina, Brazil, Kenya and Republic of Moldova.

86. Italy reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent.

III. Conclusions and recommendations

A. Conclusions

87. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Italy, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Italy

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The ERT concludes that the inventory submission of Italy is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete for the years 1990–1992 and 2010–2012, not complete for the years 1993–2009	42
LULUCF[a]	Not complete	55, 60 and 61
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Italy has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	37 and 42
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Italy has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did the Party provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

88. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9
Recommendations identified by the expert review team

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
Cross-cutting				
Energy	Solid fuel transformation – CH_4	Provide information on the charcoal production process, including information on when in the time series the modern technology replaced conventional technology	No	28
Industrial processes and solvent and other product use	General	Include in the NIR information on the legal framework and the data types and their availability to the inventory team	No	31
	Adipic acid production – N_2O	Correct the error identified and include the additional justification for the abatement efficiency of the sole production facility in Italy in the NIR	No	32
	Consumption of halocarbons and SF_6 – HFCs	Include in the NIR information concerning air-conditioning devices mounted on vehicles and metered dose inhalers, clarifying that the estimation of emissions takes into account not only the information related to national manufacturing but also to imported products	No	33
		Expand the description in the NIR regarding disposal and change the notation key used in the CRF tables to "NA" (not applicable)	No	34
		Make contact with the treatment centres to verify that the recovery rate can be assumed to be 100 per cent		

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Document reasons for the change in the F-gas time series	No	35
		Implement the plans for collecting and updating AD for this category	No	36
		Estimate emissions and identify trends using methods that are in line with the IPCC good practice guidance	No	37
	Lime production – CO_2	Include in the NIR an explanation of the minor fluctuations in the IEF for lime production	No	39
		Use the more detailed data for 2005 onwards for extrapolating the EF back to 1990	No	40
	Limestone and dolomite use – CO_2	Clarify the text in the NIR regarding the use of dolomite	No	41
		Include mineral wool production in the emission inventory, investigate other potential emissive uses of carbonates and provide information on the steps taken to ensure completeness in the NIR	No	42
Agriculture	Manure management – CH_4 and N_2O	Include a description of and reference to the method used and explain how country-specific parameters were derived	No	50
		Include in the NIR information on the method used to estimate CH_4 emissions from swine	No	51
LULUCF	General	Include additional information provided to the ERT during the review week in its next submission	No	54
		Use the notation key "NA" when a tier 1 zero stock change method is used	No	55
		Review the use of notation keys so it is clearer what methods are used or if some pools are not estimated		
	Forest land – CO_2	Document the model validations in the NIR and use NFI 2005 data to initiate model estimates until such time that the new inventory data become available	No	56
		Provide in the NIR documentation summarizing harvest removals from short rotation crops, coppices and high forest categories so that drivers influencing trends in biomass stock changes can be made more evident	No	57

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross references*
		Provide definitions and thresholds for carbon pools in a table	No	58
	Land converted to settlements – CO_2	Develop methods to distinguish between shrubland and other grassland conversions to settlements and report the associated emissions from biomass and DOM	No	59
	Lands converted to wetlands – CO_2	Estimate biomass stock changes associated with flooding of grassland and cropland	No	60
	CO_2 emissions from agricultural lime application	Report emissions from lime application consistently over the complete time series	No	61
	Direct N_2O emissions from nitrogen fertilization of forest land	Report direct N_2O emissions from nitrogen fertilization as "IE" (included elsewhere) in CRF table 5(II) and transparently explain that these emissions are reported under the agriculture sector (with a cross reference to the relevant section in the NIR)	No	62
Waste	Solid waste disposal on land – CH_4	Develop the continuous time-series variation of the methane generation constant instead of using the step function variation over the relevant periods	No	65
	Waste incineration – CO_2	Apply the time-series carbon content as well as fossil carbon fraction in line with the variation of the waste compositions	No	66

Abbreviations: AD = activity data, CRF = common reporting format, EF = emission factor, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, LULUCF = land use, land-use change and forestry, NFI = national forest inventory, NIR = national inventory report.

IV. Questions of implementation

89. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	**2 174 650 108**			**2 174 650 108**
Annex A emissions for 2012				
CO_2	386 666 727			386 666 727
CH_4	34 746 843	36 081 966		36 081 966
N_2O	27 753 867	27 526 537		27 526 537
HFCs	9 246 260			9 246 260
PFCs	1 314 038			1 314 038
SF_6	355 715			355 715
Total Annex A sources[c]	**460 083 452**	**461 191 244**		**461 191 244**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–6 594 251			–6 594 251
3.3 Afforestation and reforestation on harvested land for 2012	NA			NA
3.3 Deforestation for 2012	1 964 502			1 964 502
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012	–24 734 746			–24 734 746
3.4 Cropland management for 2012	NA			NA
3.4 Cropland management for the base year	NA			NA
3.4 Grazing land management for 2012	NA			NA
3.4 Grazing land management for the base year	NA			NA
3.4 Revegetation for 2012	NA			NA
3.4 Revegetation for the base year	NA			NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.
[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	413 379 399			413 379 399
CH_4	35 722 245	36 741 715		36 741 715
N_2O	26 889 337	26 746 652		26 746 652
HFCs	8 804 231			8 804 231
PFCs	1 454 541			1 454 541
SF_6	351 381			351 381
Total Annex A sources[c]	**486 601 134**	**487 477 919**		**487 477 919**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–6 310 260			–6 310 260
3.3 Afforestation and reforestation on harvested land for 2011	NA			NA
3.3 Deforestation for 2011	1 957 333			1 957 333
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011	–23 564 133			–23 564 133
3.4 Cropland management for 2011	NA			NA
3.4 Cropland management for the base year	NA			NA
3.4 Grazing land management for 2011	NA			NA
3.4 Grazing land management for the base year	NA			NA
3.4 Revegetation for 2011	NA			NA
3.4 Revegetation for the base year	NA			NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	424 993 195			424 993 195
CH_4	37 233 394	37 823 756		37 823 756
N_2O	27 129 155	27 020 358		27 020 358
HFCs	8 298 754			8 298 754
PFCs	1 330 834			1 330 834
SF_6	373 273			373 273
Total Annex A sources[c]	**499 358 604**	**499 840 170**		**499 840 170**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–7 708 111			–7 708 111
3.3 Afforestation and reforestation on harvested land for 2010	NA			NA
3.3 Deforestation for 2010	1 950 699			1 950 699
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010	–30 869 335			–30 869 335
3.4 Cropland management for 2010	NA			NA
3.4 Cropland management for the base year	NA			NA
3.4 Grazing land management for 2010	NA			NA
3.4 Grazing land management for the base year	NA			NA
3.4 Revegetation for 2010	NA			NA
3.4 Revegetation for the base year	NA			NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	414 809 773			414 809 773
CH_4	37 947 304	38 310 819		38 310 819
N_2O	28 126 241	28 041 258		28 041 258
HFCs	7 768 666			7 768 666
PFCs	1 062 811			1 062 811
SF_6	398 018			398 018
Total Annex A sources[c]	**490 112 813**	**490 391 345**		**490 391 345**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–7 088 496			–7 088 496
3.3 Afforestation and reforestation on harvested land for 2009	NA			NA
3.3 Deforestation for 2009	1 940 083			1 940 083
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009	–29 779 410			–29 779 410
3.4 Cropland management for 2009	NA			NA
3.4 Cropland management for the base year	NA			NA
3.4 Grazing land management for 2009	NA			NA
3.4 Grazing land management for the base year	NA			NA
3.4 Revegetation for 2009	NA			NA
3.4 Revegetation for the base year	NA			NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	463 695 604			463 695 604
CH_4	38 141 405	38 377 552		38 377 552
N_2O	29 685 779	29 567 300		29 567 300
HFCs	7 161 583			7 161 583
PFCs	1 500 589			1 500 589
SF_6	435 535			435 535
Total Annex A sources	**540 620 495**	**540 738 162**		**540 738 162**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–6 351 715			–6 351 715
3.3 Afforestation and reforestation on harvested land for 2008	NA			NA
3.3 Deforestation for 2008	1 930 283			1 930 283
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008	–27 191 207			–27 191 207
3.4 Cropland management for 2008	NA			NA
3.4 Cropland management for the base year	NA			NA
3.4 Grazing land management for 2008	NA			NA
3.4 Grazing land management for the base year	NA			NA
3.4 Revegetation for 2008	NA			NA
3.4 Revegetation for the base year	NA			NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NA = not applicable.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Italy 2014. Available at <http://unfccc.int/resource/docs/2014/asr/ita.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/ITA. Report of the individual review of the annual submission of Italy submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/ita.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Riccardo de Lauretis (ISPRA, Environmental Protection and Research Agency), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Italy:

Anon. 2014. *Information On LULUCF Actions Under Article 10(2) Of Decision 529/2013/EU*

Anon. 2014. *Global Forest Resources Assessment 2015*. Country Report Italy Rome. www.fao.org/forestry/fra

Di Cosmo et al. 2013. *Deadwood Basic Density Values For National-Level Carbon Stock Estimates In Italy*. Forest Ecology and Management 295 :51–58

Hiederer, R., E. Michéli and T. Durrant 2011. *Evaluation of BioSoil Demonstration Project - Soil Data Analysis*. EUR 24729 EN. Luxembourg: Office for Official Publications of the European Communities. 155pp.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOM	dead organic matter
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10^9 joules)
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor (agriculture) methane correction factor (waste sector)
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joules)
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
UNFCCC	United Nations Framework Convention on Climate Change
VS	volatile solids